Supplemental Digital Content(Appendix 1) for

Changes on Cesarean Section Rate before and after the End of Korean Value Incentive Program

YouHyun Park, MPH[1], Jae-hyun Kim, PhD[2], Kwang-soo Lee, PhD [1,§]

[1]Department of Health Administration, Graduate School, Yonsei University, Seoul, Republic of Korea

[2]Department of Healthcare Administration, Dankook University, Cheonan, Republic of Korea

§ Corresponding Author Kwang-soo Lee, PhD, MPH

Department of Health Administration, Yonsei University, Wonju, Gwangwondo, Republic of Korea

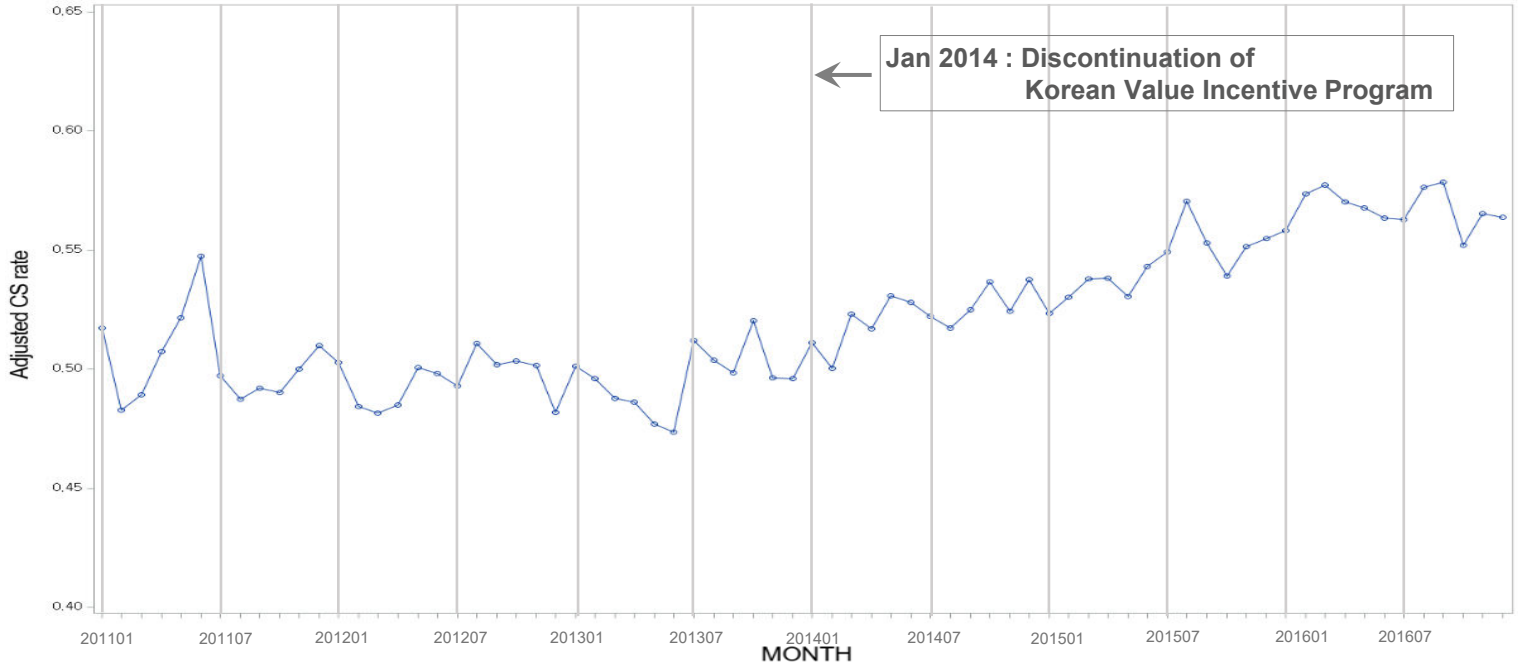
Tel : +82-33-760-2426 Email : planters@yonsei.ac.kr

Supplemental Digital Content (Appendix 1). Risk factors included in the risk-adjustment model

Risk Factors		Vaginal Delivery		Cesarean Section		p-value	Odds Ratio
		N	%	N	%		
Breech malpresentation	Yes	2,182	5.81	35,378	94.19	<0.001	56.03
	No	185,912	56.89	140,880	43.11		
Pre-eclampsia	Yes	6,323	29.07	15,426	70.93	<0.001	4.99
	No	181,771	53.06	160,832	46.94		
Malignancy	Yes	268	41.61	376	58.39	<0.001	2.76
	No	187,826	51.64	175,882	48.36		
Placenta previa	Yes	1,125	6.21	16,986	93.79	<0.001	55.15
	No	186,969	54.00	159,272	46.00		
Multiple pregnancy	Yes	3,140	62.93	1,850	37.07	<0.001	NA
	No	184,954	51.47	174,408	48.53		
Cephalopelvic disproportion	Yes	17,342	13.80	108,293	86.20	<0.001	15.31
	No	170,752	71.53	67,965	28.47		
Fetal stress	Yes	22,815	61.67	14,180	38.33	<0.001	NA
	No	165,279	50.49	162,078	49.51		
Maternal age	Yes	54,494	42.82	72,772	57.18	<0.001	1.31
	No	133,600	56.35	103,486	43.65		
Bleeding	Yes	304	29.26	735	70.74	<0.001	2.20
	No	187,790	51.69	175,523	48.31		
Cord prolapse	Yes	7,537	70.32	3,181	29.68	<0.001	NA
	No	180,557	51.06	173,077	48.94		
Diabetes	Yes	11,205	45.09	13,645	54.91	<0.001	1.10
	No	176,889	52.10	162,613	47.90		
Fetal abnormalities	Yes	19,290	42.60	25,995	57.40	<0.001	1.83
	No	168,804	52.91	150,263	47.09		
Oligohydramnios /Polyhydramnios	Yes	8,508	45.41	10,229	54.59	<0.001	1.47
	No	179,586	51.96	166,029	48.04		
Premature rupture of membranes	Yes	51,748	68.08	24,265	31.92	<0.001	NA
	No	136,346	47.29	151,993	52.71		
Previous cesarean section	Yes	2,064	3.29	60,635	96.71	<0.001	24.48
	No	186,030	61.67	115,623	38.33		
Preterm delivery	Yes	19,311	39.91	29,072	60.09	<0.001	1.71
	No	168,783	53.42	147,186	46.58		
Sexually transmitted disease	Yes	45	32.37	94	67.63	<0.001	9.12
	No	188,049	51.63	176,164	48.37		
R^2							0.67
C-statistic							0.91
Hosmer–Lemeshow test, X^2(p-value)							4,472.80 (<.0001)

†CI: confidence limit, NA: not available

Supplemental Digital Content (Appendix 2). Monthly average of risk-adjusted C-section rates in hospitals (%)



Supplemental Digital Content (Appendix 3) for

Changes on Cesarean Section Rate before and after the End of Korean Value Incentive Program

YouHyun Park, MPH[1], Jae-hyun Kim, PhD[2], Kwang-soo Lee, PhD [1,§]

[1]Department of Health Administration, Graduate School, Yonsei University, Seoul, Republic of Korea

[2]Department of Healthcare Administration, Dankook University, Cheonan, Republic of Korea

§ Corresponding Author Kwang-soo Lee, PhD, MPH

Department of Health Administration, Yonsei University, Wonju, Gwangwondo, Republic of Korea

Tel : +82-33-760-2426 Email : planters@yonsei.ac.kr

Supplemental Digital Content (Appendix 3): The autocorrelation between observations

The assumption of the standard regression model is that the observations are independent. In time series analysis, these assumption is often violated because observations that are measured at time points that are close tend to be similar than that are further. Failure to correct this autocorrelation can lead to underestimation of the standard error and overestimation of the impact of the intervention[1]. In epidemiology, autocorrelation is explained by other variables such as seasonality, but after controlling these factors, residual autocorrelation is known to be rarely a problem [2].

There was no seasonality in the C-section rates (Supplemental Digital Content (Appendix 2)), but there was an autocorrelation. Therefore, GEE model (the use of proc genmod in SAS), was chosen for the analysis to allow for heterogeneity in residual variance among the two phases, and estimation of the Autoregressive of first order(AR1) autocorrelation parameter. In other words, the structure of the covariance matrix was specified as AR1, which assume that the interval length is the same between any two observations [3].

Reference

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3. Smith T, Smith B. PROC GENMOD with GEE to analyze correlated outcomes data using SAS. *San Diego (CA): Department of Defense Center for Deployment Health Research, Naval Health Research Center.* 2006.